

CLAIMS

1. A method for processing bioresponse signals coming from organisms living in a well-defined living space, which are each comprised in a microenvironment, wherein these signals are obtained in online measuring of bioresponse variables, and wherein these signals are at least real-time
5 processed in a signal processor, wherein, on the one hand, these organisms are monitored in the said microenvironments, and wherein, on the other hand, these variables can be adjusted by corresponding signal control apparatuses in accordance with a living space control model,
characterized in that
10 the living space comprises an incubator for hatching out hatching eggs, wherein the bioresponse variables are measured and controlled in a physical and/or chemical manner, for instance in the form of optical, electrical, magnetic, acoustic or mechanical bioresponse signals, or combinations thereof.
- 15 2. A method according to claim 1, **characterized in that** the bioresponse signals are non-invasively measured.
3. A method according to claim 1 or 2, **characterized in that**
20 the bioresponse signals for hatching eggs are chosen from, for instance, but not exclusively, eggshell temperature, weight loss, pulse, blood pressure, respiration, growth, growth rate, activity, heat production, moisture production, and sound production.
- 25 4. A method according to claim 1, 2 or 3, **characterized in that**

the bioresponse signals for hatching eggs in the said microenvironments are chosen from, for instance, but not exclusively, temperature, gas concentrations, sound intensity and sound frequency.

5 5. A method according to any one of the preceding claims,
characterized in that
the living space control model comprise an intelligent control algorithm for
a process control based on a systematic or mathematical processing rule, for
instance, but not exclusively, a so-called model-based control with
10 prediction, or a process control with so-called fuzzy logic.

6. A method according to any one of the preceding claims,
characterized in that
the living space control model controls the hatching out according to
15 directions obtained and determined after expertise.

7. A method for hatching out hatching eggs, in particular for regulating
the climate conditions in an incubator during the hatching process,
including the setting, the measuring and the monitoring, as well as the
20 adjusting of gas concentrations and climate parameters such as air
temperature, air humidity, carbonic acid content, and oxygen content, and
further the measuring of egg temperatures of at least a number of hatching
eggs, characterized in that
the method successively comprises the following steps:
25 - entering a hatching egg target temperature T_{ep} into the control at the
start of the hatching process;
- measuring the egg temperature T_e at a determined point in time after the
start;

- comparing the measured T_e and T_{ep} , wherein, in the case of a difference between T_e and T_{ep} , an air temperature signal for adjusting the air temperature T_a according to an air temperature regulation is delivered; and
- repeating these steps during the hatching process at a determined next
5 point in time.

8. A method according to claim 7, **characterized in that** the air temperature regulation for adjusting the air temperature T_a successively comprises the following steps:

- 10 - entering an air target temperature T_{ap} into the control at the start of the hatching process, wherein, further, an air temperature control range A is entered between limit temperatures $T_{ap}(\min)$ and $T_{ap}(\max)$, with $T_{ap}(\min) < T_{ap} < T_{ap}(\max)$;
- measuring the air temperature T_a at a determined point in time after the
15 start;
- comparing the measured T_a with the temperatures in A, wherein, in the case that T_a has increased or decreased by a predetermined difference, the air temperatures are adjusted according to a determined control scheme; and
- 20 - repeating these steps during the hatching process at a determined next point in time.

9. A method according to claim 8, **characterized in that** it is further comprised that, when the air temperature T_a exceeds one of the
25 limit temperatures of A, an alarm signal is delivered.

10. A method according to any one of claims 7-9, **characterized in that** the egg temperature is contactlessly measured.

30 11. A method according to claim 10, **characterized in that**

the egg temperatures are measured with an apparatus according to any one of claims 12-14.

12. An apparatus for measuring, with infrared thermometers,
5 temperatures of hatching eggs placed in nests of hatching trays which are arranged in an incubator, wherein, for a preselected number of trays, the temperature is measured of a predetermined number of eggs,
characterized in that
during the hatching period, each individual thermometer contactlessly
10 measures the temperature of a corresponding individual egg according to a pre-entered measurement scheme, wherein the measuring signals obtained control an temperature control regulation.

13. An apparatus according to claim 12, **characterized in that**
15 the thermometers have been provided on holders which are placed on the hatching trays between the eggs, by means of which the temperatures of at least two individual hatching eggs are measured.

14. An apparatus according to any one of claims 12 or 13, **characterized**
20 **in that**
the apparatus further comprises a robot to automatically position the holders near the hatching eggs.

15. An apparatus according to any one of claims 12-14, **characterized**
25 **in that**
the apparatus is used for carrying out the method according to any one of claims 1-11.